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# PATENT ABSTRACTS OF JAPAN

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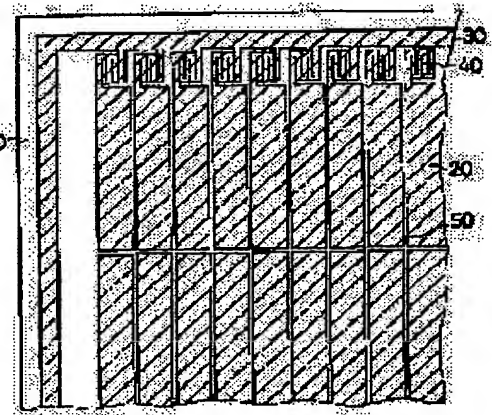
(72)Inventor : KANEDA YOSHIHIRO

## (54) LIQUID CRYSTAL DISPLAY DEVICE AND ITS MANUFACTURE

### (57)Abstract:

**PURPOSE:** To prevent an electrode pattern used for display from being damaged by electrostaticity and also to make it possible to detect a defective short-circuit between each electrode pattern, as to a method for manufacturing a liquid crystal display device.

**CONSTITUTION:** The electrode pattern 20 used for display is formed on a substrate 10, a common electrode 30 and a connection wire 40 are arranged by use of the same conductive film. The electrostaticity charged on each electrode pattern 20 at the manufacturing process of the liquid crystal display device attains the same potential through the common electrode 30, so that the breakdown caused by the discharge between the electrode patterns 20 is not generated, and also, the defective short-circuit is detected with the resistance value of the connection wire 40.



## LEGAL STATUS

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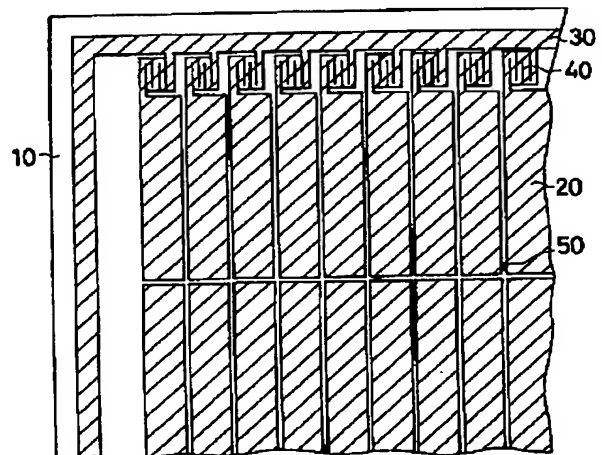
(54)【発明の名称】 液晶表示装置とその製造方法

(57)【要約】

【目的】 液晶表示装置の製造方法に於いて、表示に使用する電極パターンの静電気による破壊を防止し、かつ各電極パターン間の短絡不良を検出出来るようにすることを目的とする。

【構成】 基材10に表示に使用する電極パターン20を形成し、同一の導電膜により共通電極30及び接続配線40を配置することによる。

【効果】 液晶表示装置の製造工程に於いて各電極パターン20に帯電する静電気は、共通電極30を通じて同電位になるため電極パターン20間の放電による破壊は発生しない、また接続配線40の抵抗値により、短絡不良も検出可能となる。



## 【特許請求の範囲】

【請求項1】 表示パターンに対応する電極パターンを設けた一对の基材に液晶物質を一定方向に配向させる表面処理を施し、一方の基材の周辺にシール材を設け、該基材を組み立て、基材間に液晶を注入して液晶表示装置を製造する方法であって、各々の基材の電極パターンが他の電極パターンと導通している共通電極を有し、該電極パターンと共通電極の接続が、電極パターン幅より狭くかつ折り返しにより配線長を長くする事で得られる高抵抗の接続配線より成る事を特徴とする液晶表示装置及び前記液晶表示装置の製造方法。

【請求項2】 前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事を特徴とする請求項1記載の液晶表示装置及び前記液晶表示装置の製造方法。

【請求項3】 前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成し、さらに電気的な短絡不良検査を行い電極パターンとした後、ラビング法により液晶配向させる表面処理を施し製造される事を特長とする請求項1記載の液晶表示装置及び前記液晶表示装置の製造方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は液晶表示装置及びその製造方法であり、特に表示密度の高いドットマトリックスなどの電極パターンを有する液晶表示装置を低不良率で製造する方法に関する。

## 【0002】

【従来の技術】従来技術を図3と図4により説明すると、通常液晶表示装置は次のように作成される。一对の基材10に目的の表示パターンに対応する電極パターン20を形成し、次いで、この基材10を液晶の配向を持たせるべくラビングなどの表面処理を行い、基材10の一方の周辺にシールするためのシール材90を形成した後組み立てる。次いで、液晶80を注入し、封止した後所定の素子に切断し、偏光板60、反射板70などの接着を行ない所望の液晶表示装置がえられる。

## 【0003】

【発明が解決しようとする問題点】前記液晶表示装置の製造方法においては、用いられる基材10はガラス板もしくは樹脂板などの絶縁体であり、また所定の電極パターン20は各々の電極で液晶を駆動させるために電気的に独立した構成となっている。しかしながら、該電極パターンを形成した後、液晶を配向させるためのラビングなどの表面処理や組み立て、偏光板接着、反射板接着などを行なうため、基材10や個々に独立した電極パターン20に相当量の静電気が帯電することがあり、前記帯電電圧が一定の値以上の電圧にいたった場合、各々の電極パターン20間で自然放電が発生し、液晶を配行させる表面処理構造や電極パターン20そのものを破壊す

る問題を有している。

【0004】また従来は各々の電極パターン20の間での放電を防ぐため、共通電極を設けることにより各々の電極パターン20の間を同電位とした場合でも電極パターン20間が導通した状態のため、電極パターン20間の短絡不良が発生した場合検出できなくなってしまうなどの問題があった。

【0005】本発明の目的は、以上の問題点を解決した、液晶表示装置を提供するものである。

## 【0006】

【問題を解決するための手段】本発明は、上記問題点を解決するため、表示パターンに対応する電極パターンを設けた一对の基材に液晶物質を一定方向に配向させる表面処理を施し、一方の基材の周辺にシール材を設け、該基材を組み立て、基材間に液晶を注入して液晶表示装置を製造する方法であって、各々の基材の電極パターンが他の電極パターンと導通している共通電極を有し、該電極パターンと共通電極の接続が、電極パターン幅より狭くかつ、折り返しにより配線長を長くする事で得られる高抵抗の接続配線より成る事を特徴とし、さらに前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事を特徴とし、さらに前記基材の表面にスッパ処理により形成した前記透明導電膜をエッチングによりパターン形成し、電気的な短絡不良検査を行い電極パターンとした後、ラビング法により液晶配向させる表面処理を施し製造される事を特長とする液晶表示装置とその製造方法である。

## 【0007】

【作用】本発明によれば、各々の電極パターンは、高抵抗の接続配線で共通電極に接続されているので液晶表示セルの製造工程中に帯電した場合でも各電極パターン間は同電位となり、瞬時的な放電による破壊は発生しない。

【0008】また接続配線40の抵抗値により、仮に電極パターン間の短絡による不良が存在した場合でも、検査工程での抵抗値測定により、不良発生箇所の識別は可能となる。

## 【0009】

【実施例】以下図面により本発明の一実施例を詳述する。図1は本発明の基材10に形成された電極パターン20を示した平面図であり、図2は電極パターン20の一部を拡大した図である。

【0010】すなわち図1に示す基材10に成膜した導伝膜をフォトリソグラフィーなどの手法により、電極パターン20、共通電極30および接続配線40を同時に形成する。この接続配線40は図2に拡大して示すように、電極パターン20に比べ線幅を細く、かつ折返しパターンに依って配線長を長くすることで接続配線40の抵抗値を高くしている。例えば、電極パターンの抵抗値

は単位面積あたりの抵抗 $R_s$ と電極パターンの幅 $W$ と長さ $L$ により決められ、実施例では、電極パターンの抵抗 $R_s = 10 \text{ オーム} / (W/L)$ の導伝膜を用い、線幅 $W_1 = 1 \text{ mm}$ 、長さ $L_1 = 100 \text{ mm}$ の電極パターン20を形成する場合、接続配線40は、線幅 $W_2 = 10 \mu\text{m}$ 、長さ $L_2 = 20 \text{ mm}$ にする事で、電極パターン20の1本あたりの抵抗値は1Kオームに対して、接続配線40の抵抗値は20Kオームが得られた。すなわち接続配線40の抵抗を電極パターン20の20倍以上とした。この時仮に電極パターンに短絡不良50が存在していた場合でも、正常な電極間の抵抗値20Kオームに対し抵抗素子が並列に接続されたのと同様となり最大でも約1.8Kオームの抵抗値で短絡することがわかる。従って、不良箇所は、容易に識別が可能である。

【0011】また各々の電極パターン20の間は共通電極30により電気的に導通しているため静電気の放電によるパターンなどの破壊は、皆無となる。

【0012】

【発明の効果】以上の説明で明らかなように、本発明によれば電極パターン間の短絡不良検出を妨げる事なく、

液晶表示セルの製造過程で発生する静電気による電極パターンなどの破壊を防止し、よって低不良率で液晶表示セルを製造することが可能となった。

【図面の簡単な説明】

【図1】本発明の実施例である基材に形成された電極を示した平面図である。

【図2】本発明の実施例である図1の電極部の拡大図である。

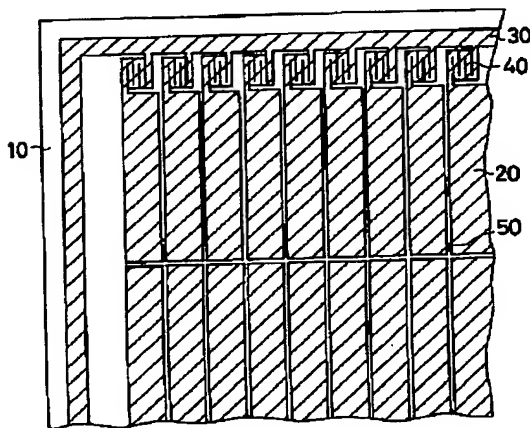
【図3】従来技術の電極パターンの平面図である。

10 【図4】液晶表示装置の断面図である。

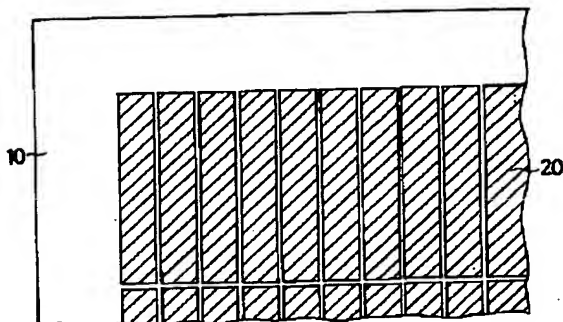
【符号の説明】

- 10 基材
- 20 電極パターン
- 30 共通電極
- 40 接続配線
- 50 短絡不良
- 60 偏光板
- 70 反射板
- 80 液晶
- 90 シール材

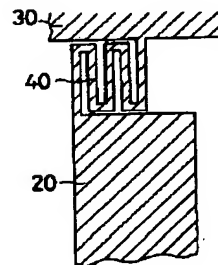
【図1】



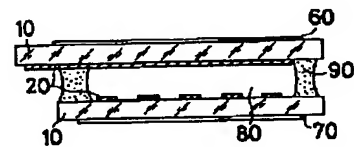
【図3】



【図2】



【図4】



【公報種別】特許法第 17 条の 2 の規定による補正の掲載  
【部門区分】第 6 部門第 2 区分  
【発行日】平成 13 年 1 月 19 日 (2001. 1. 19)

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【国際特許分類第 7 版】

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【F I】

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1/133 545  
1/1345

【手続補正書】

【提出日】平成 11 年 12 月 9 日 (1999. 12. 9)

【手続補正 1】

【補正対象書類名】明細書

【補正対象項目名】全文

【補正方法】変更

【補正内容】

【書類名】明細書

【発明の名称】液晶装置とその製造方法

【特許請求の範囲】

【請求項 1】 表示パターンに対応する電極パターンを少なくとも設けた一対の基材を間隙を設けて電極パターンを対向する如く配置しさらに前記間隙に液晶を封止するためのシール材を設け前記シール材の中に液晶物質を封止した液晶装置において、各々の前記基材の電極パターンが他の電極パターンと導通している共通電極を有し前記電極パターンと前記共通電極との接続が折り返しにより配線長を長くする事で得られる高抵抗の接続配線よりなることを特徴とする液晶装置。

【請求項 2】 表示パターンに対応する電極パターンを少なくとも設けた一対の基材を間隙を設けて電極パターンを対向する如く配置しさらに前記間隙に液晶を封止するためのシール材を設け前記シール材の中に液晶物質を封止した液晶装置において、各々の前記基材の電極パターンが他の電極パターンと導通している共通電極を有し前記電極パターンと前記共通電極の接続が電極パターン幅より狭くかつ折り返しにより配線長を長くする事で得られる高抵抗の接続配線よりなることを特徴とする液晶装置。

【請求項 3】 表示パターンに対応する前記電極パターンの抵抗値に対して高抵抗の前記接続配線の抵抗値が 2 倍以上の抵抗値を有することを特徴とする請求項 1 ま

たは請求項 2 に記載の液晶装置。

【請求項 4】 前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事の特徴とする請求項 1 又は請求項 2 又は請求項 3 に記載の液晶装置。

【請求項 5】 前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成し、さらに電気的な短絡不良検査を行うことで得られる電極を有することを特長とする請求項 1 又は請求項 2 又は請求項 3 又は請求項 4 に記載の液晶装置。

【請求項 6】 表示パターンに対応する電極パターンを設けた一対の基材に液晶物質を一定方向に配向させる表面処理を施し、一方の基材の周辺にシール材を設け、該基材を組み立て、基材間に液晶を注入して液晶装置を製造する方法であって、各々の基材の電極パターンが他の電極パターンと導通している共通電極を有し該電極パターンと共通電極の接続が、電極パターン幅より狭くかつ折り返しにより配線長を長くする事で得られる高抵抗の接続配線より製造される事の特徴とする液晶装置の製造方法。

【請求項 7】 前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事の特徴とする請求項 7 に記載の液晶装置の製造方法。

【請求項 8】 前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成し、さらに電気的な短絡不良検査を行う工程を有することで電極を得ることを特長とする請求項 6 又は請求項 7 に記載の液晶装置の製造方法。

【請求項 9】 前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成しさらに電気的な短絡不良検査を行い電極パターンとした後



ラビング法により液晶配向させる表面処理を施す工程を有することを特長とする請求項 6 又は請求項 7 又は請求項 8 に記載の液晶装置の製造方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は液晶表示装置に代表される液晶を用いた液晶装置及びその製造方法であり、特に表示密度の高いドットマトリックスなどの電極パターンを有する液晶表示装置を低不良率で製造する方法に関する。

【0002】

【従来の技術】従来技術を図 3 と図 4 により説明すると、通常液晶表示装置は次のように作成される。一对の基材 10 に目的の表示パターンに対応する電極パターン 20 を形成し、電極パターン 20 の上に配向膜を配設し、次いで、この基材 10 を液晶の配向を持たせるべくラビングなどの表面処理を行い、基材 10 の一方の周辺にシールするためのシール材 90 を形成した後、それぞれの基板の電極が向かい合うように配置し間隙を有して重ね合わせる。次いで、液晶 80 を注入し、封止した後所定の素子に切断し、偏光板 60、反射板 70 などの接着を行ない所望の液晶表示装置がえられる。上記説明は液晶装置の基本的説明であり、説明を省略するが、上記基板構成の他に、基板の上にカラーフィルタ又は及び遮光膜を配設しその上に絶縁膜を配設し、さらにその上に電極を配設し、電極の上に配向膜を配設する構成を有する液晶装置も多く用いられている。他の液晶装置の構成としては、基板の上に電極を配設し、その上にカラーフィルタを配設しその上に膜を配設し、さらにその上に配向膜を配設する構成を有する液晶装置もある。本願発明は、これらにいかなる液晶装置にも適用できるものである。

【0003】

【発明が解決しようとする問題点】前記液晶表示装置の製造方法においては、用いられる基材 10 はガラス板もしくは樹脂板などの絶縁体であり、また所定の電極パターン 20 は各々の電極で液晶を駆動させるために電氣的に独立した構成となっている。しかしながら、該電極パターンを形成した後、液晶を配向させるためのラビングなどの表面処理や組み立て、偏光板接着、反射板接着などを行なうため、基材 10 や個々に独立した電極パターン 20 に相当量の静電気が帯電することがあり、前記帯電電圧が一定の値以上の電圧にいたった場合、各々の電極パターン 20 間で自然放電が発生し、液晶を配行させる表面処理構造や電極パターン 20 そのものを破壊する問題を有している。

【0004】また従来は各々の電極パターン 20 の間での放電を防ぐため、共通電極を設けることにより各々の電極パターン 20 の間を同電位とした場合でも電極パターン 20 間が導通した状態のため、電極パターン 20 間

の短絡不良が発生した場合検出できなくなってしまうなどの問題があった。

【0005】本発明の目的は、以上の問題点を解決した、液晶表示装置を提供するものである。

【0006】

【問題を解決するための手段】本発明は、上記問題点を解決するため、表示パターンに対応する電極パターンを少なくとも設けた一对の基材を間隙を設けて電極パターンを対向する如く配置しさらに前記間隙に液晶を封止するためのシール材を設け前記シール材の中に液晶物質を封止した液晶装置において、各々の前記基材の電極パターンが他の電極パターンと導通している共通電極を有し前記電極パターンと前記共通電極との接続が折り返しにより配線長を長くする事で得られる高抵抗の接続配線よりなることを特徴とする。

【0007】また、表示パターンに対応する電極パターンを少なくとも設けた一对の基材を間隙を設けて電極パターンを対向する如く配置しさらに前記間隙に液晶を封止するためのシール材を設け前記シール材の中に液晶物質を封止した液晶装置において、各々の前記基材の電極パターンが他の電極パターンと導通している共通電極を有し前記電極パターンと前記共通電極の接続が電極パターン幅より狭くかつ折り返しにより配線長を長くする事で得られる高抵抗の接続配線よりなることを特徴とする。

【0008】また、表示パターンに対応する前記電極パターンの抵抗値に対して高抵抗の前記接続配線の抵抗値が 20 倍以上の抵抗値を有することを特徴とする。

【0009】また、前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事を特徴とする。

【0010】また、前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成し、さらに電氣的な短絡不良検査を行うことで得られる電極を有することを特長とする。

【0011】また、表示パターンに対応する電極パターンを設けた一对の基材に液晶物質を一定方向に配向させる表面処理を施し、一方の基材の周辺にシール材を設け、該基材を組み立て、基材間に液晶を注入して液晶

(表示) 装置を製造する方法であって、各々の基材の電極パターンが他の電極パターンと導通している共通電極を有し、該電極パターンと共通電極の接続が、電極パターン幅より狭くかつ折り返しにより配線長を長くする事で得られる高抵抗の接続配線より製造される事を特徴とする。

【0012】また、前記電極パターン及び共通電極及び高抵抗の接続配線がインジウム・スズ酸化物の透明導電膜により形成される事を特徴とする。

【0013】また、前記基材の表面にスッパ処理により形成した透明導電膜をエッチングによりパターン形成

し、さらに電氣的な短絡不良検査を行う工程を有することで電極を得ることを特長とする。

【0014】また、前記基材の表面にスパッタ処理により形成した透明導電膜をエッチングによりパターン形成しさらに電氣的な短絡不良検査を行い電極パターンとした後ラビング法により液晶配向させる表面処理を施す工程を有することを特長とする。

【0015】

【作用】本発明によれば、各々の電極パターンは、高抵抗の接続配線で共通電極に接続されているので液晶表示セルの製造工程中に帯電した場合でも各電極パターン間には同電位となり、瞬時的な放電による破壊は発生しない。

【0016】また接続配線40の抵抗値により、仮に電極パターン間の短絡による不良が存在した場合でも、検査工程での抵抗値測定により、不良発生箇所の識別は可能となる。

【0017】

【実施例】以下図面により本発明の一実施例を詳述する。図1は本発明の基材10に形成された電極パターン20を示した平面図であり、図2は電極パターン20の一部を拡大した図である。

【0018】すなわち図1に示す基材10にスパッタ処理により成膜した導電膜をフォトリソグラフィなどの手法により、電極パターン20、共通電極30および接続配線40を同時に形成する。この接続配線40は図2に拡大して示すように、電極パターン20に比べ線幅を細く、かつ折返しパターンに依って配線長を長くすることで接続配線40の抵抗値を高くしている。例えば、電極パターンの抵抗値は単位面積あたりの抵抗 $R_s$ と電極パターンの幅 $W$ と長さ $L$ により決められ、実施例では、電極パターンの抵抗 $R_s = 10 \text{ オーム} / (W/L)$ の導伝膜を用い、線幅 $W1 = 1 \text{ mm}$ 、長さ $L1 = 100 \text{ mm}$ の電極パターン20を形成する場合、接続配線40は、線幅 $W2 = 10 \mu\text{m}$ 、長さ $L2 = 20 \text{ mm}$ にする事で、電極パターン20の1本あたりの抵抗値は1Kオームに対して、接続配線40の抵抗値は20Kオームが得られた。すなわち接続配線40の抵抗を電極パターン20の20倍以上とした。この時仮に電極パターンに短絡不良50が存在していた場合でも、正常な電極間の抵抗値20Kオームに対し抵抗素子が並列に接続されたのと同等となり最大でも約1.8Kオームの抵抗値で短絡することがわかる。従って、不良箇所は、容易に識別が可能で

あるため、短絡検査ができるようになる。

【0019】また各々の電極パターン20の間は共通電極30により電氣的に導通しているため静電気の放電によるパターンなどの破壊は、皆無となる。

【0020】液晶装置は次のように作成される。一對の基材10に目的の表示パターンに対応する電極パターン20を上記の実施例の如く形成し、電極パターン20の上に配向膜を配設し、次いで、この基材10を液晶の配向を持たせるべくラビングなどの表面処理を行い、基材10の一方の周辺にシールするためのシール材90を形成した後、それぞれの基板の電極が向かい合うように配置し間隙を有して重ね合わせる。次いで、液晶80を注入し、封止した後所定の素子に切断し、偏光板60、反射板70などの接着を行ない所望の液晶表示装置がえられる。短絡検査工程は、基材単体で行う場合と、基材を対向させ張り合わせた状態で行う場合と、液晶を注入した後に行う場合と、偏光板あるいは反射板を張った状態で行う場合などのいろいろの工程順序が、及び手法が用いられる。本願発明はいづれの工程、工程順序、手法にたいして用いることができる。

【0021】

【発明の効果】以上の説明で明らかなように、本発明によれば電極パターン間の短絡不良検出を妨げる事なく、液晶表示セルの製造過程で発生する静電気による電極パターンなどの破壊を防止し、よって低不良率で液晶表示セルを製造することが可能となった。

【図面の簡単な説明】

【図1】本発明の実施例である基材に形成された電極を示した平面図である。

【図2】本発明の実施例である図1の電極部の拡大図である。

【図3】従来技術の電極パターンの平面図である。

【図4】液晶表示装置の断面図である。

【符号の説明】

- 10 基材
- 20 電極パターン
- 30 共通電極
- 40 接続配線
- 50 短絡不良
- 60 偏光板
- 70 反射板
- 80 液晶
- 90 シール材

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CLAIMS

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Claim(s)]

[Claim 1] Surface treatment which makes the orientation of the liquid crystal matter carry out in the fixed direction to the base material of the couple which prepared the electrode pattern corresponding to a display pattern is performed. It is the method of preparing a sealant around one base material, assembling this base material, pouring in liquid crystal between base materials, and manufacturing a liquid crystal display. The electrode pattern of each base material has other electrode patterns and the common electrode through which it has flowed. The manufacture method of the liquid crystal display characterized by consisting of the connection wiring of high resistance obtained because connection of this electrode pattern and a common electrode lengthens a wire length by the clinch more narrowly than electrode pattern width of face, and the aforementioned liquid crystal display.

[Claim 2] The manufacture method of the liquid crystal display according to claim 1 characterized by forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an inorganic stannic-acid oxide, and the aforementioned liquid crystal display.

[Claim 3] The manufacture method of the liquid crystal display according to claim 1 characterized by performing surface treatment which carries out liquid crystal orientation by the rubbing method, and being manufactured after carrying out pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing by etching, conducting still more nearly electric short circuit inspection and considering as an electrode pattern, and the aforementioned liquid crystal display.

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In the drawings, any words are not translated.

## DETAILED DESCRIPTION

## Detailed Description of the Invention]

0001]

Industrial Application] This inventions are a liquid crystal display and its manufacture method, and relate to the method of manufacturing the liquid crystal display which has electrode patterns, such as a dot matrix especially with high display density, by the low percent defective.

0002]

Description of the Prior Art] If drawing 3 and drawing 4 explain the conventional technology, a liquid crystal display will usually be created as follows. The electrode pattern 20 corresponding to the target display pattern is formed in the base material 10 of a couple, and subsequently surface treatment, such as rubbing, is performed to give the orientation of liquid crystal for this base material 10, and it assembles, after forming the sealant 90 for carrying out a seal on the outskirts of one of a base material 10. Subsequently, after pouring in and closing liquid crystal 80, it cuts for a predetermined element, and a polarizing plate 60, a reflecting plate 70, etc. are pasted up, and a desired liquid crystal display is obtained.

0003]

Problem(s) to be Solved by the Invention] In the manufacture method of the aforementioned liquid crystal display, the base materials 10 used are insulators, such as a glass plate or a resin board, and the predetermined electrode pattern 20 has the composition of having become independent electrically in order to make liquid crystal drive by each electrode. However, after forming this electrode pattern, in order to perform surface treatment and assemblies, such as rubbing for carrying out orientation of the liquid crystal, polarizing plate adhesion, reflecting plate adhesion, etc., Static electricity of a considerable amount may be charged to the electrode pattern 20 which became independent to a base material 10 or each. When it results in the voltage beyond a value with the aforementioned fixed electrification voltage, natural electric discharge occurs between each electrode patterns 20, and it has the problem which destroys the surface treatment structure and electrode pattern 20 itself which is made to \*\*\*\* liquid crystal.

0004] Moreover, since it was in the state through which between the electrode patterns 20 flowed even when between each electrode patterns 20 is made into this potential by preparing a common electrode, in order to prevent electric discharge between each electrode patterns 20 conventionally, there was a problem of it becoming impossible to detect etc., when the poor short circuit between the electrode patterns 20 occurs.

0005] The purpose of this invention offers the liquid crystal display which solved the above trouble.

0006]

Means for Solving the Problem] In order that this invention may solve the above-mentioned trouble, surface treatment which makes the orientation of the liquid crystal matter carry out in the fixed direction to the base material of the couple which prepared the electrode pattern corresponding to a display pattern is performed. It is the method of preparing a sealant around one base material, assembling this base material, pouring in liquid crystal between base materials, and manufacturing a liquid crystal display. The electrode pattern of each base material has other electrode patterns and the common electrode through which it has flowed. connection of this electrode pattern and a common electrode more narrowly than electrode pattern width of face It is characterized by consisting of the connection wiring of high resistance obtained by lengthening a wire length by the clinch. It is characterized by furthermore forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an in JUUMU stannic-acid ghost. Pattern formation of the aforementioned transparent electric conduction film furthermore formed in the front face of the aforementioned base material by SUPPATA processing is carried out by etching. After conducting electric short circuit poor inspection and considering as an electrode pattern, they are the liquid crystal display characterized by performing surface treatment which carries out liquid crystal orientation by the rubbing method, and being manufactured, and its manufacture method.

0007]

Function] Since each electrode pattern was connected to the common electrode with connection wiring of high resistance, even when it is charged in the manufacturing process of a liquid crystal display cell according to this invention, it becomes this potential between each electrode pattern, and the destruction by instant-electric discharge is not generated.

0008] Moreover, even when the defect by the short circuit between electrode patterns exists temporarily with the resistance of the connection wiring 40, discernment of a poor generating part becomes possible by resistance measurement by the inspection process.

0009]

Example] One example of this invention is explained in full detail with a drawing below. Drawing 1 is the plan having shown the electrode pattern 20 formed in the base material 10 of this invention, and drawing 2 is drawing which expanded some electrode patterns 20.

0010] That is, by technique, such as photo lithography, the electrode pattern 20, the common electrode 30, and the connection wiring 40 are simultaneously formed for \*\*\*\*\* which formed membranes to the base material 10 shown in drawing 1. Compared with the electrode pattern 20, it is thin in line breadth, and the resistance of the connection wiring 40 is made high by therefore lengthening a wire length by return at a pattern so that this connection wiring 40 may be expanded to drawing 2 and may be shown. The resistance of an electrode pattern is determined by the resistance  $R_s$  per unit area, the width of face  $W$  of an electrode pattern, and length  $L$ . for example, in the example When forming the electrode pattern (line breadth  $W_1=1\text{mm}$  and length  $L_1=100\text{mm}$ ) 20 using \*\*\*\*\* of resistance  $R_s=10\text{-ohm}/(W/L)$  of an electrode pattern, the connection wiring 40 As for the resistance per one of the electrode pattern 20, 20K ohms was obtained to 1K ohms by making it line breadth  $W_2=10\text{micrometer}$  and length  $L_2=20\text{mm}$ , as for the resistance of the connection wiring 40. That is, resistance of the connection wiring 40 was made into 20 or more times of the electrode pattern 20. Even when the poor short circuit 50 exists in the electrode pattern temporarily at this time, it turns out that it becomes equivalent to the resistance element having been connected in parallel to normal inter-electrode resistance 20K ohms, and connects too hastily with the resistance of abbreviation 1.8K ohms at the maximum. Therefore, a fault is easily discriminable.

0011] Moreover, it becomes that there is no destruction of the pattern by electric discharge of static electricity etc. since it has flowed electrically by the common electrode 30 between each electrode patterns 20.

0012]

[Effect of the Invention] Without barring the short circuit poor detection between electrode patterns by the above explanation, according to this invention so that clearly, destruction of the electrode pattern by static electricity generated in the manufacture process of a liquid crystal display cell etc. was prevented, and it became possible to manufacture a liquid crystal display cell by the low percent defective therefore.

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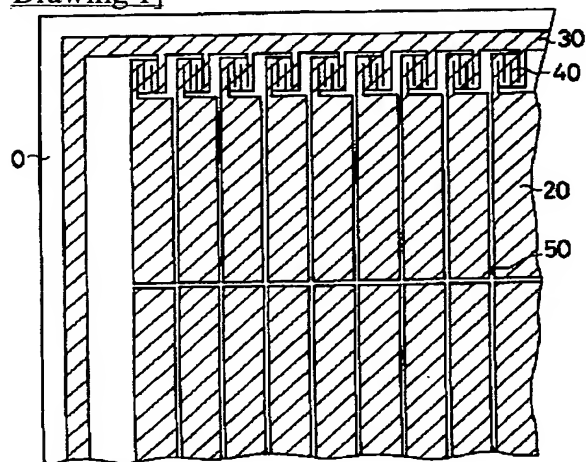
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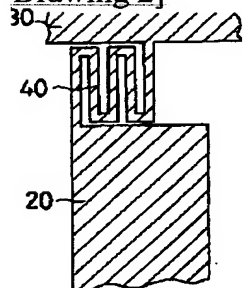
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## DRAWINGS

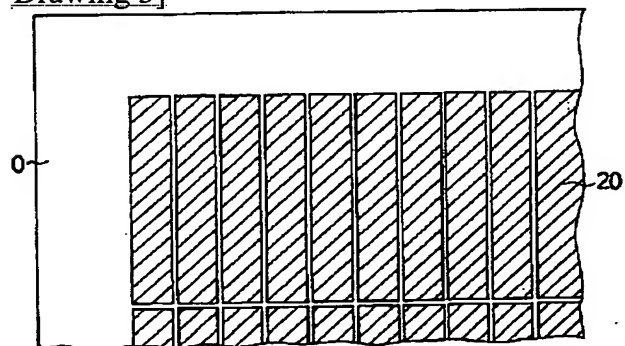
Drawing 1]



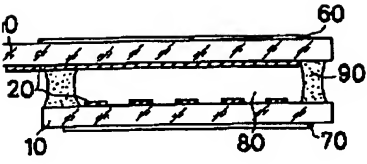
Drawing 2]



Drawing 3]



Drawing 4]



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## CORRECTION or AMENDMENT

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/133 545

/1345

Procedure revision]

Filing Date] December 9, Heisei 11 (1999. 12.9)

Procedure amendment 1]

Document to be Amended] Specification.

Item(s) to be Amended] Whole sentence.

Method of Amendment] Change.

Proposed Amendment]

Document Name] Specification.

Title of the Invention] Liquid crystal equipment and its manufacture method.

Claim(s)]

Claim 1] In the liquid crystal equipment which prepared the sealant for arranging so that a gap may be prepared for the base material of the couple which prepared the electrode pattern corresponding to a display pattern at least and an electrode pattern may be countered, and closing liquid crystal in the aforementioned gap further, and closed the liquid crystal matter in the aforementioned sealant Liquid crystal equipment characterized by the bird clapper from the connection wiring of high resistance obtained because the electrode pattern of each aforementioned base material has other electrode patterns and the common electrode through which it has flowed and connection between the aforementioned electrode pattern and the aforementioned common electrode lengthens a wire length by the clinch.

Claim 2] In the liquid crystal equipment which prepared the sealant for arranging so that a gap may be prepared for the base material of the couple which prepared the electrode pattern corresponding to a display pattern at least and an electrode pattern may be countered, and closing liquid crystal in the aforementioned gap further, and closed the liquid crystal matter in the aforementioned sealant Liquid crystal equipment with which the electrode pattern of each aforementioned base material has other electrode patterns and the common electrode through which it has flowed, and connection of the aforementioned electrode pattern and the aforementioned common electrode is characterized by the bird clapper from the connection wiring of high resistance with which it is obtained by lengthening a wire length by the



clinch more narrowly than electrode pattern width of face.

Claim 3] Liquid crystal equipment according to claim 1 or 2 characterized by the resistance of the aforementioned connection wiring of high resistance having the resistance of 20 times or more to the resistance of the aforementioned electrode pattern corresponding to a display pattern.

Claim 4] Liquid crystal equipment according to claim 1, 2, or 3 characterized by forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an in JUUMU stannic-acid ghost.

Claim 5] The claim 1 which carries out pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing by etching, and is characterized by having the electrode obtained by conducting still more nearly electric short circuit poor inspection, or liquid crystal equipment according to claim 2, 3, or 4.

Claim 6] Surface treatment which makes the orientation of the liquid crystal matter carry out in the fixed direction to the base material of the couple which prepared the electrode pattern corresponding to a display pattern is performed. It is the method of preparing a sealant around one base material, assembling this base material, pouring in liquid crystal between base materials, and manufacturing liquid crystal equipment. The manufacture method of liquid crystal equipment that the electrode pattern of each base material has other electrode patterns and the common electrode through which it has flowed, and is characterized by being manufactured from the connection wiring of high resistance with which connection of this electrode pattern and a common electrode is obtained by lengthening a wire length by the clinch more narrowly than electrode pattern width of face.

Claim 7] The manufacture method of the liquid crystal equipment according to claim 7 characterized by forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an in JUUMU stannic-acid ghost.

Claim 8] The manufacture method of the liquid crystal equipment according to claim 6 or 7 which carries out pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing by etching, and is characterized by obtaining an electrode by having the process which conducts still more nearly electric short circuit poor inspection.

Claim 9] The manufacture method of the liquid crystal equipment according to claim 6, 7, or 8 characterized by having the process which performs surface treatment which carries out liquid crystal orientation by the rubbing method after carrying out pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing by etching, conducting still more nearly electric short circuit poor inspection and considering as an electrode pattern.

Detailed Description of the Invention]

0001]

Industrial Application] This inventions are the liquid crystal equipment using the liquid crystal represented by the liquid crystal display, and its manufacture method, and relate to the method of manufacturing the liquid crystal display which has electrode patterns, such as a dot matrix especially with high display density, by the low percent defective.

0002]

Description of the Prior Art] If drawing 3 and drawing 4 explain the conventional technology, a liquid crystal display will usually be created as follows. The electrode pattern 20 corresponding to the target display pattern is formed in the base material 10 of a couple, an orientation film is arranged on the electrode pattern 20, and subsequently surface treatment, such as rubbing, is performed to give the orientation of liquid crystal for this base material 10, it arranges so that the electrode of each substrate may face each other, after forming the sealant 90 for carrying out a seal on the outskirts of one of a base material 10, and a gap is had and piled up. Subsequently, after pouring in and closing liquid crystal 80, it cuts for a predetermined element, and a polarizing plate 60, a reflecting plate 70, etc. are pasted up, and a desired liquid crystal display is obtained. Although the above-mentioned explanation is fundamental explanation of liquid crystal equipment and explanation is omitted, many liquid crystal equipments which have a light filter or the composition which reaches, arranges a shading film, arranges an insulator layer on it, arranges an electrode on it further, and arranges an orientation film on an electrode are also used on [ other than the above-mentioned substrate composition ] the substrate. There is also liquid crystal equipment which has the composition which arranges an electrode on a substrate, arranges a light filter on it as composition of other liquid crystal equipments, arranges a film on it, and arranges an orientation film on it further. The invention in this application is applicable to any liquid crystal equipments at these.

0003]

Problem(s) to be Solved by the Invention] In the manufacture method of the aforementioned liquid crystal display, the base materials 10 used are insulators, such as a glass plate or a resin board, and the predetermined electrode pattern 20

as the composition of having become independent electrically in order to make liquid crystal drive by each electrode. While carrying out a deer. After forming this electrode pattern, in order to perform surface treatment and assemblies, such as rubbing for carrying out orientation of the liquid crystal, polarizing plate adhesion, reflecting plate adhesion, etc., Static electricity of a considerable amount may be charged to the electrode pattern 20 which became independent of a base material 10 or each. When it results in the voltage beyond a value with the aforementioned fixed electrification voltage, natural electric discharge occurs between each electrode patterns 20, and it has the problem which destroys the surface treatment structure and electrode pattern 20 itself which is made to \*\*\*\* liquid crystal. [0004] Moreover, since it was in the state through which between the electrode patterns 20 flowed even when between each electrode patterns 20 is made into this potential by preparing a common electrode, in order to prevent electric discharge between each electrode patterns 20 conventionally, there was a problem of it becoming impossible to detect etc., when the poor short circuit between the electrode patterns 20 occurs.

[0005] The purpose of this invention offers the liquid crystal display which solved the above trouble.

[0006]

[Means for Solving the Problem] In order that this invention may solve the above-mentioned trouble. In the liquid crystal equipment which prepared the sealant for arranging so that a gap may be prepared for the base material of the couple which prepared the electrode pattern corresponding to a display pattern at least and an electrode pattern may be countered, and closing liquid crystal in the aforementioned gap further, and closed the liquid crystal matter in the aforementioned sealant It is characterized by the bird clapper from the connection wiring of high resistance obtained because the electrode pattern of each aforementioned base material has other electrode patterns and the common electrode through which it has flowed and connection between the aforementioned electrode pattern and the aforementioned common electrode lengthens a wire length by the clinch.

[0007] Moreover, it sets to the liquid crystal equipment which prepared the sealant for arranging so that a gap may be prepared for the base material of the couple which prepared the electrode pattern corresponding to a display pattern at least and an electrode pattern may be countered, and closing liquid crystal in the aforementioned gap further, and closed the liquid crystal matter in the aforementioned sealant. The electrode pattern of each aforementioned base material has other electrode patterns and the common electrode through which it has flowed, and connection of the aforementioned electrode pattern and the aforementioned common electrode is narrower than electrode pattern width of face, and it is a clinch. It is characterized by the bird clapper from the connection wiring of high resistance obtained by lengthening a wire length.

[0008] Moreover, it is characterized by the resistance of the aforementioned connection wiring of high resistance having the resistance of 20 times or more to the resistance of the aforementioned electrode pattern corresponding to a display pattern.

[0009] Moreover, it is characterized by forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an in JUUMU stannic-acid ghost.

[0010] Moreover, pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing is carried out by etching, and it is characterized by having the electrode obtained by conducting still more nearly electric short circuit poor inspection.

[0011] Moreover, surface treatment which makes the orientation of the liquid crystal matter carry out in the fixed direction to the base material of the couple which prepared the electrode pattern corresponding to a display pattern is performed, a sealant is prepared around one base material, this base material is assembled, and liquid crystal is poured in between base materials. It is the method of manufacturing liquid crystal (display) equipment, and the electrode pattern of each base material has other electrode patterns and the common electrode through which it has flowed, and is characterized by being manufactured from the connection wiring of high resistance obtained because connection of this electrode pattern and a common electrode lengthens a wire length by the clinch more narrowly than electrode pattern width of face.

[0012] Moreover, it is characterized by forming the aforementioned electrode pattern, a common electrode, and connection wiring of high resistance with the transparent electric conduction film of an in JUUMU stannic-acid ghost.

[0013] Moreover, pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing is carried out by etching, and it is characterized by obtaining an electrode by having the process which conducts still more nearly electric short circuit poor inspection.

[0014] Moreover, after carrying out pattern formation of the transparent electric conduction film formed in the front face of the aforementioned base material by SUPPATA processing by etching, conducting still more nearly electric short circuit poor inspection and considering as an electrode pattern, it is characterized by having the process which performs surface treatment which carries out liquid crystal orientation by the rubbing method.

[0015]

[Function] Since each electrode pattern was connected to the common electrode with connection wiring of high resistance, even when it is charged in the manufacturing process of a liquid crystal display cell according to this invention, it becomes this potential between each electrode pattern, and the destruction by instant-electric discharge is not generated.

[0016] Moreover, even when the defect by the short circuit between electrode patterns exists temporarily with the resistance of the connection wiring 40, discernment of a poor generating part becomes possible by resistance measurement by the inspection process.

[0017]

[Example] One example of this invention is explained in full detail with a drawing below. Drawing 1 is the plan having shown the electrode pattern 20 formed in the base material 10 of this invention, and drawing 2 is drawing which expanded some electrode patterns 20.

[0018] That is, by technique, such as photo lithography, the electrode pattern 20, the common electrode 30, and the connection wiring 40 are simultaneously formed in the base material 10 shown in drawing 1 for the electric conduction film which formed membranes by spatter processing. Compared with the electrode pattern 20, it is thin in line breadth, and the resistance of the connection wiring 40 is made high by therefore lengthening a wire length by return at a pattern so that this connection wiring 40 may be expanded to drawing 2 and may be shown. For example, it is determined by the resistance  $R_s$  per unit area, the width of face  $W$  of an electrode pattern, and length  $L$ , and the resistance of an electrode pattern is at an example. When the electrode pattern (line breadth  $W_1=1\text{mm}$  and length  $L_1=100\text{mm}$ ) 20 was formed using \*\*\*\*\* of resistance  $R_s=10\text{-ohm}/(W/L)$  of an electrode pattern, it is setting connection wiring 40 to line breadth  $W_2=10\text{micrometer}$  and length  $L_2=20\text{mm}$ , and, as for the resistance per one of the electrode pattern 20, 20K ohms was obtained to 1K ohms, as for the resistance of the connection wiring 40. That is, resistance of the connection wiring 40 was made into 20 or more times of the electrode pattern 20. Even when the poor short circuit 50 exists in the electrode pattern temporarily at this time, it turns out that it becomes equivalent to the resistance element having been connected in parallel to normal inter-electrode resistance 20K ohms, and connects too hastily with the resistance of abbreviation 1.8K ohms at the maximum. Therefore, since it is discriminable, shunt evaluation comes to be able to do a fault easily.

[0019] Moreover, it becomes that there is no destruction of the pattern by electric discharge of static electricity etc. since it has flowed electrically by the common electrode 30 between each electrode patterns 20.

[0020] Liquid crystal equipment is created as follows. The electrode pattern 20 corresponding to the target display pattern is formed in the base material 10 of a couple like the above-mentioned example, and on the electrode pattern 20, an orientation film is arranged and it ranks second. Surface treatment, such as rubbing, is performed to give the orientation of liquid crystal for this base material 10, after forming the sealant 90 for carrying out a seal on the outskirts of one of a base material 10, it arranges so that the electrode of each substrate may face each other, and a gap is had and piled up. Subsequently, after pouring in and closing liquid crystal 80, it cuts for a predetermined element, and a polarizing plate 60, a reflecting plate 70, etc. are pasted up, and a desired liquid crystal display is obtained. Various process sequence in the case where a base-material simple substance performs a shunt evaluation process, the case where it carries out in the state where made the base material counter and it was made to rival, the case where it carries out after pouring in liquid crystal, the case of carrying out, where a polarizing plate or a reflecting plate is stretched, etc., and technique are used. The invention in this application can be used so much for which process, process sequence, and technique.

[0021]

[Effect of the Invention] Without barring the short circuit poor detection between electrode patterns by the above explanation, according to this invention so that clearly, destruction of the electrode pattern by static electricity generated in the manufacture process of a liquid crystal display cell etc. was prevented, and it became possible to manufacture a liquid crystal display cell by the low percent defective therefore.

[Brief Description of the Drawings]

[Drawing 1] It is the plan having shown the electrode formed in the base material which is the example of this invention.

[Drawing 2] It is the enlarged view of the polar zone of drawing 1 which is the example of this invention.

[Drawing 3] It is the plan of the electrode pattern of the conventional technology.

[Drawing 4] It is the cross section of a liquid crystal display.

[Description of Notations]

10 Base material.

20 Electrode pattern.

30 Common electrode.

40 Connection wiring.  
50 A poor short circuit  
50 Polarizing plate.  
70 Reflecting plate.  
30 Liquid crystal.  
90 Sealant.

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[Translation done.]